Summary Evaluation of the Divine Strake Environmental Assessment

Charles A. Wight
Professor of Chemistry
University of Utah

Executive Summary

Divine Strake is an experiment in which 700 tons of ANFO explosive will be detonated above an existing hardened tunnel (U16b) on the Nevada Test Site (NTS). The purpose is to gather scientific and modeling data required to develop new capabilities for attacking hard and deeply buried targets in support of the DoD Global Strike concept.

The Draft December 2006 Revised Environmental Assessment (EA) for Devine Strake is a thorough and detailed assessment of the possible risks posed to persons, property and the environment. It is based largely on an extension of more comprehensive EIS for the NTS that was published in 1996, and a supplement published in 2002. The data in these documents provide sufficient evidence for a Finding of No Significant Impact (FONSI) for the proposed Divine Strake experiment.

Summary of Potential Hazards to the Public Outside the NTS

1. **Noise and Disruption from the Initial Blast**
   The nearest segment of the NTS boundary lies approximately 14 miles east of U16b, the proposed site of the experiment. At this distance, the noise from the explosion is expected to be about 10x lower than the threshold for causing tinnitus (ringing of the ears), and is expected to be within OSHA noise level limits for industrial workers. These estimates are based on modeling data and on results from similar blasts, including several larger blasts from previous experiments at NTS and elsewhere. The estimates are somewhat uncertain because adverse environmental conditions can cause noise to carry much longer distances. However, if the experiment is carried out under the required meteorological conditions, no hazard to the public is anticipated from the noise of the blast.

2. **Radiation from fallout at the U16b site**
   U16b was constructed in 1998, and has been used previously for tests of conventional explosives; however, it has not been used for any type of nuclear or radiological testing. The surface-level soil and rock in the vicinity of U16b contains low but measurable levels of man-made radioactivity resulting from fallout from nuclear tests conducted at other sites in the NTS. The levels are well below established screening levels, so the area is safe to work without taking any precautions against radiation exposure. Tests of subsurface soil and rock revealed only natural background radiation with no contamination from man-made fallout.

   The EA contains the results of modeling studies for exposure to a worst-case plume of soil resulting from Divine Strake at the eastern boundary of NTS. The

projected exposure is 0.005 mrem, which is about 200x less than the average daily exposure that Americans normally get from all sources, and is roughly equivalent to the exposure that one would get by watching television for one evening. Therefore, the potential hazards to the public associated with disturbance of fallout at U16b are negligible.

3. **Radiation from the muckpile at U16a**
The nearest place to U16b where nuclear tests were conducted previously is the U16a site, located about 1.1 miles southwest of U16b. The U16a site contains a so-called muckpile consisting of rock and other mining debris from excavations performed in support of six prior nuclear tests. As stated in the EA, the large distance between U16b and U16a makes it extremely unlikely that any of the radioactive material in the muckpile will be disturbed by the blast. This conclusion is based on the fact that the energy of the shock wave associated with any blast drops off rapidly with increasing distance from the center of the explosion. This behavior is well known from modeling and experimental data from many other blasts of conventional (non-nuclear) explosives comparable in size to Divine Strake.

At a distance of 100 feet from the center of the explosive charge (ground zero, or GZ), the extent of disruption is expected to be complete, with soil and rock being discharged into the air approximately 4800 feet.

However, at a distance of 1000 feet from GZ, humans and large animals may be expected to survive the blast, even in the open, and the extent of disruption of the surface soil should be minor. Based on my personal observations of large explosions, the shockwave kicks up some dust a few feet into the air, but this settles and dissipates in several seconds.

At a distance of 1 mile from GZ, the energy of the shockwave should be reduced by 10x compared with the effects at 1000 feet. The blast would be expected to break windows and cause structural damage to any (hypothetical) ordinary buildings and dwellings at this distance. This is because structures present large areas of surface perpendicular to the expanding shock wave. However, at the ground level, even small variations in the elevation of the terrain tend to deflect and dissipate the energy of the shock so that there is only a remote possibility that radioactive soil and rock at U16a could be lofted into the atmosphere to any measurable extent. A person standing on top of the U16a muckpile during the experiment would feel a sharp jolt at the arrival of the shockwave and would likely suffer minor permanent hearing loss from the sound of the blast, but would be otherwise unharmed.

Because the U16a muckpile is located more than 1.2 miles from GZ, the radioactive material located at U16a poses no significant threat to the public as a result of the proposed Divine Strake experiment.